NJDOE MODEL CURRICULUM PROJECT			
CONTENT AREA: Mathematics	**Course: Algebra II**	**UNIT #: 1**	**UNIT NAME: Polynomials**

#	STUDENT LEARNING OBJECTIVES	CORRESPONDING CCSS
1	Use Properties of operations to add, subtract, and multiply complex numbers.	N.CN.1 N.CN.2
2	Solve quadratic equations with real coefficients that have complex solutions.	N.CN.7 A.REI.4b
3	**+** Show that the fundamental Theorem of Algebra is true for quadratic polynomials.	N.CN.9
4	Restructure by performing arithmetic operations on polynomial/rational expressions.	A.APR.2 A.APR.4
5	Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.* ★	A.SSE.4
6	Use an appropriate factoring technique to factor expressions completely.	**A.SSE.2** A.APR.3
7	Explain the relationship between zeros and factors of polynomials and use zeros to construct a rough graph of the function defined by the polynomial.	**A.SSE.2** A.APR.3 F.1F.7c

Major Content **Supporting Content** **Additional Content** *(Identified by PARCC Model Content Frameworks*).
Bold type indicates grade level fluency requirements. *(Identified by PARCC Model Content Frameworks).*

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Selected Opportunities for Connection to Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. **Model with mathematics.***
5. Use appropriate tools strategically.
6. **Attend to precision.**
   SLO 5 Communicate the precise answer to a real-world problem.
7. **Look for and make use of structure.**
   SLO 6 Identify expressions as single entities, e.g. the difference of two squares.
8. **Look for and express regularity in repeated reasoning.**
   SLO 5 Arrive at the formula for finite geometric series by reasoning about how to get from one term in the series to the next.

All of the content presented in this course has connections to the standards for mathematical practices.

* This course includes exponential and logarithmic functions as modeling tools. (PARCC Model Content Frameworks)

Bold type identifies possible starting points for connections to the SLOs in this unit.

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Code #	Common Core State Standards
N.CN.1	Know there is a complex number *i* such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.
N.CN.2	Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
N.CN.7	Solve quadratic equations with real coefficients that have complex solutions.
N.CN.9	**(+)** Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.
A.REi.4b	Solve quadratic equations in one variable. b. Solve quadratic equations by inspection (e.g., for $x2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.
A.SSE.2	Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*
A.SSE.4	Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.* ★
A.APR.2	Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only *if* $(x - a)$ is a factor of p(x).
A.APR.3	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
A.APR.4	Prove Polynomial identities and use them to describe numerical relationships. For example, the polynomial identity $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples.
F.1F.7c	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior

Major Content **Supporting Content** **Additional Content** *(Identified by PARCC Model Content Frameworks)*.

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